CLAIMS

1. An optical amplifier comprising:
an optical waveguide structure through which signal light and pump light are propagated, said optical waveguide structure having a core with a relatively high refractive index and a clad with a relatively low refractive index, at least said core exhibiting a nonlinear response of second or third order, to thereby achieve optical parametric amplification of said signal light; and
separate idler light filter means (5) for attenuating idler light, which is generated in the process of optical parametric amplification, said idler light filter means being placed in said optical waveguide structure at a defined length $L_{max}$.

2. Optical amplifier according to claim 1 where the length $L_{max}$ is defined by the difference between power of the pump wave and the signal wave, the gain factor of the waveguide, the absorption of the waveguide.

3. Optical amplifier according to claim 1 where the length $L_{max}$ is

$$L_{eff\,\max} = \frac{P_{po}(dB) - P_{so}(dB) + 3}{\frac{10}{\ln(10)} 2g \; - \alpha(dB/km)}$$

$P_{po}$ is pump power, (dB) in logarithmic units
$g^2 = (\gamma\, P_{po}(W))^2 - (\kappa/2)^2$ is the gain coefficient
$\gamma$ is waveguide nonlinear coefficient
$\kappa$ is the phase matching term
$\alpha$ is waveguide attenuation

4. Optical amplifier according to claim 1 where the filter reduced at least 50% of the power of idler wave.